LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. **(Currently Amended)** A method for detecting misfiring in an internal combustion engine (1) by analysing the angular acceleration (acc) of the drive shaft (4)[,] ; the method comprising the steps of:

~~in which~~ estimating the value (acc) of the angular acceleration of the drive shaft (4) ~~is estimated~~ at predetermined angular positions of this drive shaft (4) [,] ;

comparing the absolute value (acc) of the angular acceleration of the drive shaft (4) ~~is compared~~ with a predetermined threshold value (S)~~, and~~ ;

detecting the presence of a misfire ~~is detected~~ if the absolute value (acc) of the angular acceleration of the drive shaft (4) is greater than the predetermined threshold value (S) [,] ;

~~characterised in that~~ filtering, when the presence of a misfire is detected, [[i.e.]] when an absolute value (acc) of the angular acceleration of the drive shaft (4) exceeds the threshold value (S), a set of values (acc) of the angular acceleration of the drive shaft (4) subsequent to the value (acc) of the angular acceleration of the drive shaft (4) at which the misfire has been detected ~~is filtered~~ to eliminate the oscillation component generated by the misfire with respect to the value (acc) of the angular acceleration of the drive shaft (4) [,] ; and

comparing only the filtered values (acc) of the angular acceleration of the drive shaft (4) ~~being compared~~ with the threshold value (S) to detect the presence of any further misfires subsequent to the misfire detected.

2. **(Currently Amended)** A method as claimed in claim 1, ~~in which wherein~~ including filtering the values (acc) of the angular acceleration of the drive shaft (4) subsequent to the value (acc) of the angular acceleration of the drive shaft (4) at which the misfire has been detected are filtered by algebraically adding to these values a corresponding set of correction values obtained at the design and development stage of the engine (1) by analysing the oscillation

generated by a misfire with respect to the value (acc) of the angular acceleration of the drive shaft (4).

3. (Currently Amended) A method as claimed in claim 2, ~~in which wherein~~ including calculating the correction values are calculated by subtracting a corresponding set of values (acc) of the angular acceleration of the drive shaft (4) in the presence of a misfire from a set of values (acc) of the angular acceleration of the drive shaft (4) in standard conditions.

4. (Currently Amended) A method as claimed in claim 2, ~~in which~~ wherein the correction values are variable as a function of the current engine point.

5. (Currently Amended) A method as claimed in claim 4, ~~in which~~ wherein, at the design stage of the engine (1), a plurality of salient engine points are identified, at each of which the corresponding sample set of correction values is calculated, and during the normal operation of the engine (1), the set of correction values for the current engine point is calculated by interpolating the sample sets of correction values.

6. (Currently Amended) A method as claimed in claim 4, ~~in which~~ wherein, at the design stage of the engine (1), a plurality of salient engine points are identified, at each of which the corresponding sample set of correction values is calculated, and a single standard reference set independent from the engine point is calculated from the sample sets of correction values, and during the normal operation of the engine (1), the set of correction values for the current engine point is calculated from the standard reference set.

7. (Currently Amended) A method as claimed in claim 6, ~~in which wherein~~ including expressing the set of values (acc) of the angular acceleration of the drive shaft (4) and the set of correction values ~~are expressed~~ as angular acceleration of the drive shaft (4) as a function of the angular position of the drive shaft (4), the standard reference set being expressed

as a ratio between angular acceleration of the drive shaft (4) and engine load (1) as a function of time.

8. (Currently Amended) A method as claimed in claim 7, ~~in which~~ wherein the engine load (1) is indicated by the flow of fresh air supplied to the engine (1).

9. (Currently Amended) A method as claimed in claim 1, ~~in which wherein~~ including filtering a set of eight values (acc) of the angular acceleration of the drive shaft (4) are filtered from the value (acc) of the angular acceleration of the drive shaft (4) at which the misfire has been detected.

10. (Currently Amended) A method as claimed in claim 1, ~~in which~~ wherein the threshold value (S) for the detection of the misfire is a function of the current engine point.

11. (Currently Amended) A method as claimed in claim 1, ~~in which~~ wherein, for each complete rotation of the drive shaft (4), as many values (acc) of the angular acceleration of the drive shaft (4) are estimated as there are cylinders (2) performing combustion during a complete rotation of the drive shaft (4).

12. (Currently Amended) A method as claimed in claim 1, ~~in which~~ wherein, in each complete rotation of the drive shaft (4), as many angular measurement sections having the same amplitude are identified as there are cylinders (2) performing combustion during a complete rotation of the drive shaft (4), the time taken by the drive shaft (4) to travel each angular measurement section being measured, and the value (acc) of the angular acceleration of the drive shaft (4) at the ith instant being calculated by applying the following formula:

$$acc_i = \frac{T_{i+1} - T_i}{T_i^3}$$

in which:

acc_i is the angular acceleration of the drive shaft (4) at the i-th moment;

T_{i+1} is the time used by the drive shaft (4) to pass over the (i+1)-th angular measurement line;

T_i is the time used by the drive shaft (4) to pass over the i-th angular measurement line.

13. (Currently Amended) A method as claimed in claim 12, ~~in which wherein~~ including measuring the time taken by the drive shaft (4) to travel each angular measurement section is measured using the signal supplied by the phonic wheel (5) which is provided with a disc having 60 teeth (6), each angular measurement section having an angular amplitude equal to a number of teeth (6) of the phonic wheel (12) of between 3 and 12.

14. (Currently Amended) A method as claimed in claim 12, ~~in which~~ wherein each angular section is at least partially superimposed with respect to the expansion stroke of a respective piston (3).

15. (Currently Amended) A method as claimed in claim 12, ~~in which~~ wherein each angular section substantially coincides with the expansion stroke of a respective piston (3).